

CLAIMS

1. A method of preparing fish food flakes comprising the steps of:
preparing a slurry that includes fish meal and flour;
heating the slurry in order to dry the slurry into a sheet;
applying a solution containing one or more water dispersable nutritional ingredients to the slurry as it is drying such that the slurry is sufficiently cooled in order to prevent significant degradation of said applied nutritional ingredients; and
breaking up the dried slurry in order to form a plurality of flakes.
2. The method of claim 1, wherein said slurry is prepared having a water content of between about 70 and 80 weight percent and a solid content of between about 20-30 weight percent.
3. The method of claim 1, wherein said prepared slurry further includes an oil.
4. The method of claim 3, wherein the prepared slurry includes between about 7 and 10 weight percent fish meal, between about 5 and 7 weight percent flour and between 1 and 2 weight percent oil.
5. The method of claim 1, wherein the slurry is heated by applying it to a heated surface having a temperature of at least 300° F.
6. The method of claim 1, wherein said heating step dries the slurry to a moisture content of between 2 and 10 weight percent.
7. The method of claim 5, wherein the slurry becomes heated due to application to said heated surface to a temperature sufficient to bind the fish meal and flour ingredients.
8. The method of claim 1, wherein said solution applying step comprises spraying said solution onto the drying slurry.
9. The method of claim 1, wherein said nutritional ingredients have a particle size of no greater than 150 microns.

10. The method of claim 1, wherein said solution is applied to the drying slurry when said drying slurry is at a temperature of no greater than about 300°F.
11. The method of claim 1, wherein said solution is applied onto said drying slurry for a time period of between about 1 and 4 seconds.
12. The method of claim 1, wherein said one or more nutritional ingredients comprises at least one of vitamin C and a carotenoid.
13. The method of claim 12, wherein said vitamin C is esterified.
14. The method of claim 12, wherein said carotenoid is selected from the group consisting of beta-carotene, astraxanthin and lutein.
15. The method of claim 12, wherein said nutritional ingredients further include at least one of an attractant and a palatant.
16. The method of claim 15, wherein the attractant is betaine.
17. The method of claim 1, wherein said fish meal and flour are pulverized to a particle size of no greater than 150 microns.
18. The method of claim 12, wherein the vitamin C is pulverized to a particle size of no greater than 150 microns.
19. The method of claim 8, wherein said solution is sprayed onto the drying slurry at a spray flow rate of between about 0.5 and 0.7 lbs. of said solution per minute.
20. The method of claim 8, wherein said solution is sprayed onto the drying slurry at a fluid pressure of between about 45 and 75 p.s.i.
21. The method of claim 8, wherein said solution is sprayed by means of one or more spray nozzles.
22. The method of claim 21, wherein said spray nozzles have an applied air pressure of between about 70 and 90 p.s.i .
23. The method of claim 1, wherein said applied solution further includes a colorant.
24. The method of claim 23, wherein the colorant is a natural colorant.
25. The method of claim 24, wherein the natural colorant is selected from the group consisting of carmine and fruit and vegetable extracts.

26. The method of claim 1, wherein the weight amount of fish meal in the slurry is at least substantially equal to the weight amount of the flour.
27. The method of claim 24, wherein the weight ratio of fish meal to flour is between about 1:1 and 2:1.
28. The method of claim 1, wherein said nutritional ingredients are selected from the group comprising vitamins and minerals.
29. The method of claim 1, wherein said breaking step is carried out by means of a rotating screw.
30. The method of claim 1, wherein said breaking up step is carried out by means of a screen.
31. A system of preparing fish food flakes comprising:
a slurry which includes fish meal and flour; and
a solution including one or more water soluble or dispersible nutritional ingredients suitable for spraying onto the slurry during heat drying such that degradation of said nutritional ingredients is prevented.
32. The system of claim 31, wherein the slurry has a solid portion which includes said fish meal and said flour in an amount between about 70 and 80 weight percent and a liquid portion comprising about 20 and 30 weight percent.
33. The system of claim 31, wherein said slurry further includes an oil.
34. The system of claim 33, wherein said fish meal is present in an amount between about 7-10 weight percent, the flour is present in an amount between about 5 and 7 weight percent and the oil is present in an amount between about 1-2 weight percent.
35. The system of claim 31, wherein the slurry is at a temperature of less than about 300°F when said solution is sprayed thereon.
36. The system of claim 31, wherein said nutritional ingredients have a particle size of no greater than 150 microns.
37. The system of claim 31, wherein said one or more nutritional ingredients comprise at least one of vitamin C and a carotenoid.
38. The system of claim 37, wherein said vitamin C is esterified.

39. The system of claim 37, wherein said carotenoid is selected from the group consisting of beta-carotene, astaxanthin and lutein.
40. The system of claim 37, wherein said nutritional ingredients further include at least one of an attractant and a palatant.
41. The system of claim 40, wherein the attractant is an amino acid.
42. The system of claim 31, wherein said fish meal and said flour are pulverized to a particle size of no greater than about 100 mesh.
43. The system of claim 31, wherein said spray solution further includes a colorant.
44. The system of claim 43, wherein the colorant is a natural colorant.
45. The system of claim 44, wherein the natural colorant is selected from the group consisting of carmine and fruit and vegetable extracts.
46. The system of claim 31, wherein the weight ratio of fish meal to flour is between about 1:1 and 2:1.
47. The system of claim 31, wherein said nutritional ingredients are selected from the group comprising vitamins and minerals.
48. A fish food flake product comprising;
a flake material comprising fish meal and flour and having an external surface; and
one or more water soluble and/or dispersible nutritional ingredients sprayed onto the external surface of said flake material.
49. The product of claim 48, wherein said flake material also includes an oil.
50. The product of claim 49, wherein the oil is selected from the group including fish oil and vegetable oil.
51. The product of claim 48, wherein the weight ratio of fish meal to flour is between about 1:1 and 2:1.
52. The product of claim 48, wherein said nutritional ingredients have a particle size of no greater than about 150 microns.
53. The product of claim 48, wherein said one or more nutritional ingredients comprises at least one of vitamin C and a carotenoid.
54. The product of claim 53, wherein said vitamin C is esterified.

55. The product of claim 53, wherein said carotenoid is selected from the group consisting of beta-carotene, astaxanthin and lutein.
56. The product of claim 53, wherein said nutritional ingredients further include at least one of an attractant and a palatant.
57. The product of claim 56, wherein the attractant is an amino acid.
58. The product of claim 48, further including a colorant sprayed onto said flake material.
59. The product of claim 58, wherein the colorant is a natural colorant.
60. The product of claim 59, wherein the natural colorant is selected from the group consisting of carmine and fruit and vegetable extracts.
61. The product of claim 48, wherein said nutritional ingredients are selected from the group comprising vitamins and minerals.
62. The system of claim 58, wherein said flake product has a speckled pattern.
63. Fish food flakes produced by the method of claim 1.